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10/816,546

04/01/2004

Srikanth Krishnamurthy

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EXAMINER

AJIBADE AKONAI, OLUMIDE

ART UNIT

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2617

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--|---|--|
| Office Action Summary | Application No. 10/816,546 | Applicant(s) KRISHNAMURTHY ET AL. | |
| | Examiner OLUMIDE T. AJIBADE AKONAI | Art Unit 2617 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>06/01/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claim 34 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 6 of U.S. Patent No. 6,735,448. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 34 of the present application is a broader version of claim 6 of U.S. Patent No. 6,735,448.

Claim 6 of U.S. Patent No. 6,735,448 includes all of the limitations of **claim 34** of the instant invention as follows:

sending a beacon signal from the first node at a known transmit power;
measuring the received power level of the beacon signal at the second node;

calculating an optimum transmit power from the second node to the first node based upon the known transmit power and the received power level of the beacon; and utilizing the optimum transmit power when sending the data from the second node to the first node.

However claim 6 of U.S. Patent No. 6,735,448 also includes the following limitations;

Transmitting a second beacon signal from the third node at a known transmit power level, measuring a received power level of the second beacon signal at the second node; ranking, by the second node, the first and third nodes based upon the received power level of the beacon signal from the first node and the received power level of the second beacon signal from the third node; and picking a closest node based upon the step of ranking.

Nonetheless, the removal of said limitations from claim 34 of the present application made claim 34 a broader version of claim 6 of U.S. Patent No. 6,735,448. Therefore, since omission of an element and its function in a combination is an obvious expedient if the remaining elements perform the same functions as before (In re Karlson (CCPA) 136 USPQ 184 (1963)), claim 34 is not patentably distinct from claim 6 of U.S. Patent No. 6,735,448.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1-39 are rejected under 35 U.S.C. 102(a) as being anticipated by **Elbatt et al "Power Management for Throughput Enhancement in Wireless Ad-hoc Networks"** (hereinafter **Elbatt**).

Regarding **claim 1**, Elbatt discloses a wireless communication network (see page 1507, fig. 1) comprising: a set of n nodes (see fig. 1, page 1507, col. 1, line 16), where at least one of the n nodes comprises: an antenna element for transmitting and receiving a wireless signal (see fig. 1, page 1507, col. 1, lines 6-10); a detector element configured to determine a minimum transmittance power required to convey data to a cluster of nodes (all mobile nodes are able to determine minimum power level required to reliably transmit to a cluster indicating presence a detector element, see page 1507, col. 2, lines 37-42, page 1509, col. 2, lines 43-48, page 1510, col. 1, lines 1-11), the cluster comprising N nodes of the set of n nodes, wherein $2 \leq N < n - 1$ (see page 1508, col. 2, lines 33-41); and a transmit power adjustment element, operatively interfaced with the detector element, the transmit power adjustment element configured to provide the minimum transmittance power to the antenna element (providing minimum power that guarantees reliable communication to a cluster, indicating presence of a transmit power adjuster element, see page 1508, col. 2, lines 33-46, page 109, col. 2, lines 43-48, page 1510, col. 1, lines 1-20).

Regarding **claim 10**, Elbatt discloses a wireless communication device (see fig. 1, page 1507, col. 1, line 16) for use in a wireless communication network (see page 1507, fig. 1) comprising: an antenna element for transmitting and receiving a wireless

signal (see fig. 1, page 1507, col. 1, lines 6-10); a detector element configured to determine a minimum transmittance power required to convey data to a cluster of nodes (all mobile nodes are able to determine minimum power level required to reliably transmit to a cluster indicating presence a detector element, see page 1507, col. 2, lines 37-42, page 1509, col. 2, lines 43-48, page 1510, col. 1, lines 1-11), the cluster comprising N nodes of a set of n nodes, wherein $2 \leq N < n - 1$ (see page 1508, col. 2, lines 33-41); and a transmit power adjustment element, operatively interfaced with the detector element, the transmit power adjustment element configured to provide the minimum transmittance power to the antenna element (providing minimum power that guarantees reliable communication to a cluster, indicating presence of a transmit power adjuster element see page 1508, col. 2, lines 33-46, page 109, col. 2, lines 43-48, page 1510, col. 1, lines 1-20).

Regarding **claim 16**, Elbatt discloses a wireless communication network (see page 1507, fig. 1) comprising: a set of n nodes (see fig. 1, page 1507, col. 1, line 16), the set comprising a cluster of N nodes where $2 \leq N < n - 1$ (see page 1508, col. 2, lines 33-41), a first node outside the cluster (see fig. 1, page 1507, col. 1, line 16), and a second node inside the cluster (see page 1508, col. 2, lines 33-41), wherein at least one node in the cluster of N nodes communicates directly with the other N-1 nodes in its cluster (see page 1508, col. 2, lines 33-41), and the first node communicates with the second node via multiple hops (see page 1508, col. 2, lines 33-41); and the at least one node comprising: a detector element configured to determine a minimum transmittance power required to convey data to a node within the cluster of nodes (all mobile nodes

are able to determine minimum power level required to reliably transmit to a cluster indicating presence a detector element, see page 1507, col. 2, lines 37-42, page 1509, col. 2, lines 43-48, page 1510, col. 1, lines 1-11); and a transmit power adjustment element operatively interfaced with the detector element, the transmit power adjustment element configured to provide the minimum transmittance power to an antenna element (providing minimum power that guarantees reliable communication to a cluster, indicating presence of a transmit power adjuster element see page 1508, col. 2, lines 33-46, page 109, col. 2, lines 43-48, page 1510, col. 1, lines 1-20).

Regarding **claim 24**, Elbatt discloses a power-controlled wireless communication device for use in a network (see page 1507, fig. 1), the network having n nodes (see fig. 1, page 1507, col. 1, line 16), said power-controlled wireless communication device comprising: an antenna element for radiating and detecting signals (see fig. 1, page 1507, col. 1, lines 6-10), the antenna element configured to receive a signal from another wireless communication device (see fig. 1, page 1507, col. 1, lines 6-10); a detector element configured to determine a received power level of the received signal from the other wireless communication device (all mobile nodes are able to determine minimum power level required to reliably transmit to a cluster indicating presence a detector element, see page 1507, col. 2, lines 37-42, page 1509, col. 2, lines 43-48, page 1510, col. 1, lines 1-11), the other wireless communication device transmitting at a known transmit power level (see page 1507, col. 2, lines 37-42, page 1509, col. 2, lines 43-48, page 1510, col. 1, lines 1-11), the other wireless communication device belonging to a cluster of nodes (see page 1508, col. 2, lines 33-41), the cluster having N

nodes, where $2 \leq N < n-1$ (see page 1508, col. 2, lines 33-41); and a connectivity table for storing an ID of the other wireless communication device and an associated transmit power level associated with the other wireless communication device (connectivity table, see fig. 4, page 1508), the associated transmit power level being calculated from the known transmit power level and the received power level (see equation (4), page 1510, col. 1).

Regarding **claim 2** as applied to claim 1, Elbatt the network having a first node outside of the cluster (see page 1508, col. 2, lines 33-41) and a second node within the cluster (see page 1508, col. 2, lines 33-41), wherein each node within the cluster of N nodes communicates directly with other nodes within the cluster, and the first node communicates with the second node via multiple hops (see page 1508, col. 2, lines 10-15, lines 33-41).

Regarding **claims 3, 11 and 17** as applied to claims 1, 10 and 16, Elbatt further discloses wherein at least one of the nodes is a power-adjustable node (providing minimum power that guarantees reliable communication to a cluster, indicating presence of a transmit power adjuster element, see page 1508, col. 2, lines 33-46, page 109, col. 2, lines 43-48, page 1510, col. 1, lines 1-20), the power-adjustable node further comprises a connectivity table for storing an ID and the minimum transmittance power associated with the power adjustable node within the cluster (connectivity table, see fig. 4, page 1508).

Regarding **claims 4 and 12** as applied to claims 1 and 10, Elbatt further discloses wherein the detector element determines the minimum transmittance power

by comparing an attenuation of a signal originating at a first node within the cluster with a known transmittance power of the first node (see page 1509, col. 2, lines 20-38).

Regarding **claims 5 and 19** as applied to claims 1 and 16, Elbatt further discloses wherein the wireless communication network is an ad-hoc network of sensors (see page 1507 col. 1, line 16).

Regarding **claims 6 and 20** as applied to claims 1 and 16, Elbatt further discloses wherein the wireless communication network is an ad-hoc low-mobility network (see page 1507 col. 1, lines 16-19).

Regarding **claims 7, 13, 21 and 25** as applied to claims 1, 10, 16 and 24, Elbatt further discloses wherein the detector element periodically updates the minimum transmittance power required to convey data to the N nodes (see fig. 4, page 1508).

Regarding **claims 8, 14, 22 and 26** as applied to claims 1, 10, 16 and 24, Elbatt further discloses wherein the detector element dynamically determines an operating power level based on multi-hop data throughput (see page 1507, col. 2, lines 37-42, page 1509, col. 2, lines 43-48, page 1510, col. 1, lines 1-11).

Regarding **claims 9, 15, 23, 27, 31 and 27** as applied to claims 1, 10, 16, 24 and 28, Elbatt further discloses wherein the minimum transmittance power is selected based on interference zones and multi-hop data throughput (see page 1508, col. 2, lines 33-46, page 109, col. 2, lines 43-48, page 1510, col. 1, lines 1-20).

Regarding **claim 18** as applied to claim 16, Elbatt further discloses wherein the detector element determines the minimum transmittance power by comparing an

attenuation of a signal originating at a third node within the cluster with a known transmittance power of the third node (see page 1509, col. 2, lines 20-38).

Regarding **claim 28**, Elbatt discloses a method for improving multi-hop network data throughput in wireless ad hoc networks by optimizing transmitter output power, the wireless ad hoc network having n nodes, the method comprising acts of: receiving a plurality of signals (see fig. 1, page 1507, col. 1, lines 6-10) from different wireless nodes (see fig. 1, page 1507, col. 1, line 16) in the wireless ad hoc network (see page 1507, fig. 1) wherein at least one received signal has a known transmittance power (see page 1507, col. 1, lines 29-35); calculating a degree of signal attenuation for at least one node in the cluster (see page 1509, col. 2, lines 20-30); and utilizing the determined degree of signal attenuation and the known transmittance powers to calculate a near optimal transmittance power (see page 1509, col. 2, lines 20-38), whereby a cluster of N neighbors is determined, wherein $2 \leq N < n - 1$ (see page 1508, col. 2, lines 33-41).

Regarding **claim 34**, Elbatt discloses a method of optimizing power consumption in a network, the network having a first node and a second node, the method comprising steps of: receiving a beacon signal from the first node at a known transmit power (see page 1509, col. 1, lines 27-30); measuring a received power level of the beacon signal at the second node (see page 1509, col. 1, lines 27-35); calculating a optimum transmit power from the second node to the first node based upon the known transmit power and the received power level of the beacon (see page 1510, col. 1, lines 1-20); and utilizing the optimum transmit power when sending data from the second node to the first node (see page 1510, col. 1, lines 1-20).

Regarding **claims 29 and 35** as applied to claims 28 and 34, Elbatt further discloses periodically updating the near optimal transmittance power (see page 1508, col. 2, lines 33-46, page 109, col. 2, lines 43-48, page 1510, col. 1, lines 1-20).

Regarding **claims 30 and 36** as applied to claims 28 and 34, Elbatt further discloses dynamically updating the near optimal transmittance power (see page 1508, col. 2, lines 33-46, page 109, col. 2, lines 43-48, page 1510, col. 1, lines 1-20).

Regarding **claims 32 and 38** as applied to claims 28 and 34, Elbatt further discloses wherein the method is applied to a network of sensor nodes (see page 1507 col. 1, line 16).

Regarding **claims 33 and 39** as applied to claims 28 and 34, Elbatt further discloses wherein the method is applied to a network of low-mobility (see page 1507 col. 1, lines 16-19).

Regarding **claim 37** as applied to claim 34, Elbatt further discloses wherein the near optimal transmittance power is calculated so as to minimize interference zones and maximize multi-hop data throughput (see page 1508, col. 2, lines 33-46, page 109, col. 2, lines 43-48, page 1510, col. 1, lines 1-20).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Volkan Rodoplu and Teresa H. Meng discloses "Minimum Energy Mobile Wireless Networks".

Salonaho et al 6,574,485 discloses power control in a radio system.

Bringby et al 6,175,745 discloses an initial transmit power determination in a radio telecommunication system.

Burt et al 6,253,077 discloses downstream power control in point-to-multipoint systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to OLUMIDE T. AJIBADE AKONAI whose telephone number is (571)272-6496. The examiner can normally be reached on M-F, 8.30p-5p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Appiah can be reached on 571-272-7904. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

OA

/Charles N. Appiah/
Supervisory Patent Examiner, Art Unit 2617